DATED: 05/08/01

EXHIBIT IV
Concept Study Products List

1. Mars Ascent Description (including at least the following)
   1.1 MAV Sequence of Events
   1.2 MAV vehicle, including any identified options
   1.3 MAV payload injection capability, including dispersions
   1.4 Trajectory descriptions

2. MAV System Description (including at least the following)

2.1 Overview of all MAV system elements including Ground Rules and Assumptions; Configuration, Structural Analyses and Description; Guidance, Navigation, and Control; Thermal Analyses; Propulsion System(s) Description; Pre-Launch Operations, etc.

2.2 Mass lists, including at least current best estimate and identification of mass savings /growth rationales for margin level.
2.3 Power required from Lander
2.4 Martian environment protection
2.5 Functionality
2.6 Block diagrams for system and critical subsystems (where appropriate)
2.7 Computing needs and margins
2.8 Degree of autonomy
2.9 Identification of all relevant margins including launch margin above expected mass including growth contingency
2.10 Heritage assumptions
2.11 Critical interface properties
2.12 Robustness to off-nominal conditions
2.13 Redundancy, treatment of single point failures
2.14 Erection System (if required)

3 Advanced Technologies

3.1 Assumed performance for advanced technology elements and basis of Assumptions
3.2 Fallback options if technology performance is not achieved and impact
3.3 Road Map for required technology demonstrations

4. Costs and Schedule

4.1 Overall MAV costs including development, integration and test, demonstration and deployment
4.2 Development cost, and cost profile per development phase and per NASA Fiscal year
4.3 Assumptions regarding benefits from duplicating systems flown in technology demonstrations
4.4 Cost and schedule risk, cost uncertainty

4.5 Basis of cost (nominal and uncertainty) and cost estimating methodology (analogy, parametric, grass-roots are some examples)